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SOCIAL AND EMOTIONAL BEHAVIOR IN INFANCY--SOME DEVELOPMENTAL ISSUES AND PROBLEMS.

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INVESTIGATIONS INTO THE NATURE AND DEVELOPMENT OF SOCIAL AND EMOTIONAL BEHAVIOR IN HUMAN INFANCY HAVE RAISED MANY RESEARCH ISSUES AND HAVE INDICATED MANY ADDITIONAL AREAS OF INQUIRY. EARLY AND CONTEMPORARY STUDIES HAVE BOTH BEEN CONCERNED WITH PROVIDING MORE PRECISE ANALYSES OF STIMULUS AND SITUATIONAL DETERMINANTS OF SOCIAL AND EMOTIONAL BEHAVIOR, ALTHOUGH THE EARLY STUDIES WERE PRIMARILY DESCRIPTIVE WHEREAS THE EMPHASIS TODAY IS ON ANALYTIC STUDIES. TWO IMPORTANT ASPECTS OF STIMULUS-AND-SITUATIONAL-DETERMINANTS RESEARCH ARE (1) THE DEVELOPMENT OF ATTACHMENT BEHAVIOR IN INFANTS (ESPECIALLY TO THE MOTHER) AND (2) THE ROLE OF VARIOUS STIMULUS CUES AS ELICITORS OR REINFORCERS OF BEHAVIOR. INVESTIGATIONS OF APPROACH AND WITHDRAWAL PROCESSES INVOLVE A SECOND MAJOR RESEARCH AREA. ASPECTS OF APPROACH AND WITHDRAWAL THAT DEAL ESSENTIALLY WITH THE DIRECTIONAL AND AROUSAL CHARACTERISTICS OF INFANT RESPONSES ARE (1) EXPLORATORY BEHAVIOR, (2) CURIOSITY, AND (3) INTRINSIC MOTIVATION. PRESENT RESEARCH PROBLEMS INVOLVE (1) ADEQUATE CONCEPTUALIZATION OF EMOTIONAL PROCESSES EARLY IN LIFE, (2) IDENTIFICATION OF THE BEHAVIORAL INDICATORS OF EMOTIONAL RESPONSES IN INFANTS, AND (3) DETERMINATION OF THE INFLUENCE OF OTHER BASIC PSYCHOLOGICAL PROCESSES ON SOCIAL AND EMOTIONAL BEHAVIOR. THIS PAPER WAS PRESENTED AT THE MERRILL-PALMER INSTITUTE CONFERENCE ON RESEARCH AND TEACHING OF INFANT DEVELOPMENT (FEBRUARY 9-11, 1967). IT IS TO BE PUBLISHED IN THE MERRILL-PALMER QUARTERLY, VOLUME 14, 1968. (WD)

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SOCIAL AND EMOTIONAL BEHAVIOR IN INFANCY: SOME DEVELOPMENTAL ISSUES AND PROBLEMS

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My major concern in this paper will not be to present a broad summary of the principle literature dealing with social and emotional development in infancy. A number of excellent reviews and discussions of some of the most salient topics in this broad area have appeared within the past several years (e.g., Yarrow's review of the effects of maternal separation (1964), Bronfenbrenner's paper on early deprivation in mammals and man (1968), Rheingold's discussion of the development of social behavior in infancy (1966), etc. Rather, my main purpose will be to point out and discuss what seem to me to be some important current research issues and areas of investigation which hold particular promise for advancing our understanding of the nature and development of social and emotional behavior in human infancy. At the same time, I would like to indicate both the historical contrast, as well as the continuity, between these contemporary research issues and those which represented some of the main concerns of earlier investigators in the field of child development. I shall therefore precede my discussion of current research emphases with a brief summary of the early descriptive studies of social and emotional behavior and development in infancy.

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Some Definitional Notes

Thus far I've used the terms "social" and "emotional" rather glibly, as though they were either closely related, or possibly even interchangeable. This usage of the two terms in close juxtaposition, which one finds quite commonly, reflects the fact that there is indeed a close relationship between social and emotional behavior. A great many significant social interactions in infancy involve important affective or emotional components; similarily, some of the most potent instigators of emotional responses are "social" stimuli, i.e., stimuli emitted by another person. On the other hand, if one regards social behavior, broadly considered, as any behavior that is evoked, maintained, and modified by the behavior of another person (Rheingold 1966), obviously much social behavior is not associated with significant emotional responses; at the same time, important emotional responses are evoked by a wide range of non-social stimuli. In my discussion today, I shall be concerned with emotional behavior whether instigated by social or non-social stimuli; with respect to social behavior, however, my primary reference will be to social responses which typically have significant emotional or affective components associated with them.

The problem of defining the precise nature of what is meant by the "emotions" or "affects" has been a major concern of many philosophers, psychologists, and physiologists for a good many years. At this point in our discussion, it would be helpful to have at least a brief working definition of emotional behavior. I have found the following conceptualization, distilled from a variety of sources, to be particularly meaningful: we tend to regard a particular behavior as "emotional" when it represents an appreciable change from some typical "baseline", or characteristic level or mode of response, and where the behavioral change is accompanied by physiological or visceral changes and by a change in subjective or experiential state, generally along a pleasure-displeasure or hedonic

continuum. Thus, we might say that an emotion typically has a behavioral or action component, a physiological or arousal component, and a subjective or hedonic component (Hamburg, 1963). This last component, that of subjective state or feeling, is obviously the most troublesome and controversial one conceptually, and as expected, it poses particular problems for us when we try to analyze the nature of emotions in infants. A final definitional note: while the terms "emotional" and "affective" are often used interchangeably, in common usage the latter usually implies some reference to the subjective component, whereas the former may not.

Early Descriptive Studies of Social and Emotional Behavior in Infancy

Early studies of social and emotional behavior in infancy tended to be primarily descriptive in nature, and were addressed particularly to the question of what sorts of social and emotional responses were typically observable in children at successive age levels. The major historical change, as in many areas of study in child development, has been the transition from this descriptive focus to the contemporary emphasis on analytic studies, which are primarily concerned with understanding the nature of social and emotional behavior, and with the question of how particular patterns of developmental change come about. While it has become somewhat fashionable in recent years to speak rather disparagingly of studies which are primarily descriptive in nature, I would like to emphasize the very real importance of these early studies, which provided so many insightful observations and questions concerning social and emotional behavior, often foreshadowing a good deal of the content of contemporary research in the area.

Three major sources of data on social and emotional development are provided

by these early studies in the field. First, there are the informal, but detailed qualitative observations and descriptions reported by such early investigators as Charles Darwin, whose classic treatise on "The expression of the emotions in man and animals", written nearly a hundred years ago (1873) is still an essential reference in the field; James Sully, writing in England in 1895, and Stern in Germany about 20 years later (1924), describing and speculating about the nature of young children's fear of strange, novel, or unusual objects; James Baldwin in America (1895), describing what he called "organic bashfulness" in the latter part of the first year of life, when the infant turned away from the stranger and toward the mother; and finally Karl and Charlotte Buhler in Austria, in the late 1920's and early thirties describing the affective pleasure infants derive from simple motoric movements, and from mastery of simple motoric tasks (i.e., "function pleasure") (1930).

The second source of descriptive information on social and emotional behavior is provided by the systematic normative data collected in the development and standardization of the various infant tests, beginning with Buhler (1935) and Gesell (1928) in the twenties. While social and emotional responses represented only a small part of the total pool of items included in most of the early baby tests, we still depend very much on such data for descriptive information regarding the age of appearance of particular behaviors such as smiling or cooing in response to the adult face, showing displeasure at the removal of a toy, engaging in playful social imitation, etc. (e.g., Gesell 1940, Griffiths 1954).

The third major source of data is found in the realatively large number of systematic descriptive or quasi-experimental studies which began to appear mainly in the early and middle thirties. These investigations typically involved the collection of information concerning the age of appearance of a variety of specific emotional and social behaviors, based either on observations or parental records

and reports for fairly large samples of children. (Bridges 1932, Blatz & Millichamp 1935, Jersild & Holmes 1935, Jones & Jones 1928).

Given this threefold body of literature, what is the general portrayal of the over-all course of social and emotional development in the first two years of life which emerges therefrom? First, with respect to the infant's changing social responsiveness, the general picture provided by these studies remains a fairly reliable one, although it is limited to rather gross developmental changes. Very briefly, clear cut pleasureful social responses to other people do not appear until approximately the end of the second month, when any human face readily instigates smiling and other indications of positive affect. This indiscriminate positive social response to humans continues until approximately the 5th or 6th month, after which smiling at strangers seems to be considerably reduced. Moreover, toward the end of the first year there is a rather marked tendency for infants to respond to the approach of a stranger with considerable distress and anxiety. Simultaneously, affectional attachments to specific adults such as the parents become more marked and clearly delineated, and this trend continues into the second year, during the latter part of which one also see increasing social and affectional interactions with other children. While the general pattern of developmental change just outlined seems reasonably well established, we sorely need more precise descriptions of these changes in social responsiveness and their variations, as well as systematic analyses of the various major influences which function as determinants of such changes. A concern with precisely these sorts of questions represents one of the major emphases of contemporary research in the field.

Turning next to a consideration of the somewhat more general problem of emotional behavior and development, it is probably fair to say that a good many of the specific issues and questions raised by early investigators in this field are still very much with us. Many of the early studies were concerned with such

questions as what emotional responses, if any, are present in the neonate (Watson 1917); at what points in subsequent development is it possible to identify specific emotions (or emotional behaviors, we would prefer to say nowadays); how are these expressed; what are the stimulus situations which evoke emotional responses of a particular sort; etc.

Again there are a few broad, empirical generalizations emerging from these studies which most people would probably regard as reasonably acceptable today. In the neonate, one can only differentiate between states of quiescence and undifferentiated excitement (according to Bridges, 1932), or between quiescence and a primitive sort of "unpleasure" (Spitz, 1950). By the end of the first month one can more readily distinguish between quiescence and what Bridges calls "distress" reactions, but it is not until the end of the 2nd or 3rd month that clear "pleasurable" responses are seen, chiefly in the smiling, increased vocalizations, and bodily activity constituting the positive social response to people. From this point on, with increasing development, more highly differentiated forms of positive as well as negative emotional behaviors occur. Just how distinct these are, and how one can best conceptualize, observe, and measure them are thorny problems that are very much in the forefront of our current thinking and research today (e.g., Escalona 1953, Spitz 1963, Tomkins 1962, 1963, Wolff 1966).

Some Contemporary Research Emphases and Significant Areas of Investigation

Having reviewed very briefly the general nature and major outcomes of the primarily descriptive earlier studies of social and emotional development in infancy, let us consider next two rather broad areas of contemporary research activity which appear to me to involve particularly promising lines of empirical

as well as theoretical investigation.

One of the major emphases characterizing a large body of current research is a concern with more detailed analyses of the role of stimulus and situational determinants of social and emotional responses. This emphasis is particularly well represented in recent research on the development of attachment behavior in infants, and in research concerned with specifying the role of various stimulus cues as elicitors, and sometimes as reinforcers, of responses involved in adult-infant interaction. In both instances, we find a great deal of significant research currently being undertaken not only with humans, but with various species of infra-human mammals and birds as well.

Much of the recent and contemporary work aimed at specifying the processes involved in the development of the infant's attachment to familiar adults has been greatly influenced, if not stimulated, by Bowlby's theoretical writings on the nature of the mother-infant tie (1958) and the related problem of separation anxiety (1960). Bowlby suggested that certain innate response systems in the infant's repertoire play an important role in establishing the initial "tie" with the mother, since these responses are readily elicitable by appropriate stimuli and help to ensure proximity to and caretaking by mother. Included among such response systems are sucking, clinging, and visual or locomotor following behavior, as well as smiling and crying, the last two serving as particularly effective stimuli for eliciting social or caretaking responses from mother. The infant's first manifestations of protest and distress reactions on separation from mother are regarded as a form of "primary anxiety", associated with the persistent activation of such response systems as crying, clinging, and following under circumstances (i.e., isolation from mother) which prevent their normal termination (i.e., proximity to mother). Bowlby goes on to point out the importance of the connection between these separation reactions and the infant's fear or fright

responses to stimuli instigating escape or freezing, such as sudden noise, strangeness, etc. Observations of infants of many species indicate that relatively intense fear reactions are terminated not by mere flight alone but by escape to a particular "haven of safety" (e.g., a home nest, another animal, or the mother). Thus, after the infant has developed specific attachments to adults, being frightened and at the same time separated from mother poses for the infant a situation where the terminating or distress reducing situation both for the escape behaviors instigated by the fright stimulus, and for the crying, clinging, and following responses instigated by separation is essentially the same, namely, closeness to mother. Circumstances such as these place the infant in a situation of "double exposure" to distress reactions which specifically require mother for their alleviation.

Several recent studies provide good illustrations of contemporary investigations in which problems of the sort just indicated are being investigated empirically under circumstances which permit one to examine rather closely some of the relevant stimulus and situational determinants of the behavior under investigation. Morgan and Ricciuti (1968) examined changes in infants' affective responses to a stranger during the period from 4 to 12 months, employing a laboratory situation in which a male and female stranger systematically approached the infant, who was sometimes on mother's lap, sometimes four feet away from her. Generally speaking, the younger the infants, the more positive the responses to the stranger, and it was not until the 12 month level that one could characterize the reactions as generally more negative than positive. Prior to 8 months of age, the infants were equally positive in their responses regardless of their proximity to mother; from this point on, however, closeness to mother began to play an increasingly important role, with the responses to the stranger being significantly less positive or more negative when the infant was separated from mother (as one would

expect from Bowlby's theory). The younger infants responded more positively as the stranger initiated closer and more active social contact, whereas the opposite was true for the older infants. Finally, the female stranger elicited more positive and less negative reactions from the infants at all ages than did the male stranger.

Another example of research concerned with specifying the role of paticular situational variables may be found in an interesting series of experiments by Rheingold (1968) in which she examined the emotional and exploratory behavior of 9 1/2 month old infants in a strange laboratory room whose characteristics were systematically varied. Infants placed alone in the room when it was either empty, contained a few toys, or contained a strange young female about 6 feet away, showed a good deal of emotional distress and inhibited normal locomotor activity. In contrast to this group, babies who found their mothers present in the otherwise empty room produced non-distress vocalizations rather than crying, and explored the room freely. In short, Rheingold concludes, mother's presence seemed to neutralize the strangeness of the environment confronting the infant. There was some evidence, also, suggesting that the strange room was most distressing when it contained the unfamiliar person.

These findings, that proximity to mother attenuates the infant's negative responses to strange stimuli and supports positive emotional responses and exploratory behavior, are strikingly paralleled in recent animal studies, even when the "mother" happens to be a cloth-covered surrogate to which infant rhesus monkeys had become "attached" (Harlow 1961), or a green styrafoam rectangle to which Peking ducklings had been imprinted (Stettner and Tilds, 1966). It seems quite clear that our understanding of the complex factors involved in the interplay between the infant's developing attachment to specific adults and the nature of his responses to separation and to fear eliciting stimuli will be considerably

facilitated as we continue to find ways of studying objectively the specific influence of various major determinants of the social and emotional behaviors involved.

Thus far we have been discussing recent analyses of stimulus and situational determinants of social and emotional responses at given points in development. There is obviously great need for a more complete understanding of how initial patterns of response are subsequently modified through experience and learning. This is particularly true in regard to the development of the complex, mutually adaptive response patterns involved in infant-adult attachment behavior. A number of investigators have been concerned with the role of specific stimuli as elicitors and reinforcers of some of the social and emotional responses involved in mother-infant interaction, within a learning framework. It has been shown, for example, (Rheingold, Gewirtz, and Ross 1959), that three month old infants made increasingly frequent vocalizations to an adult when such vocalizations were immediately followed by the adult smiling broadly, making "tsk, tsk" sounds, and touching the infant lightly on the abdomen. When such "reinforcement" no longer followed the infants' vocalizations, their frequency decreased substantially.

The study just mentioned was concerned with the effects of adult reinforcement of infant vocalizations under controlled, experimental conditions. Can learning analyses of this sort be employed profitably in the study of naturally occurring infant-adult interaction? The recent work of Gewirtz and Gewirtz (1968) provides an excellent illustration of a research strategy aimed at facilitating learning analyses of infant-adult interaction occurring in "natural" settings. These investigators began by making detailed observational records of the sequential behaviors of infants and mothers (or other adult caretakers) in several different environments. Analysis of these records then permits them to define and compare the caretaking environments, in terms of the availability of specific stimuli of

various sorts as potential elicitors and/or reinforcers of infant social responses (e.g., specific caretaking behaviors of adults, physical characteristics of the environment, etc.). Further analyses make it possible to determine the relative frequency of occurrence of various infant responses to particular adult behaviors, and vice versa. Some preliminary analyses indicate, for example, that the likelihood of an infant's vocalization being followed by an adult's smile varied from .21 to .42 for different adult-child pairs, whereas the likelihood that the infant's smile would elicit an adult smile was considerably greater, from .46 to .88. Further work, either under way or planned, is aimed at more refined evaluations of the degree to which various adult responses are made contingent upon particular infant behaviors, and at methods for handling longer sequential interaction "chains". Although complicated and time consuming, this approach holds great promise both for defining more precisely the salient features of the environment impinging on the infant, and for understanding how the infant and adults in his environment begin to modify one another's behavior.

The last problem just mentioned has been under investigation in a somewhat different manner in the earliest weeks of life by Sander and Julia (1966). By employing procedures which permit continuous 24-hour monitoring of the infant's motility, crying, periods of sleep and wakefulness, as well as various interventions by the nurse-caretaker, these investigators are able to examine relationships between the infants' rhythm patterns and the caretaker's interventions as these become modified over a period of weeks, in the direction of increasing or decreasing regulation and adaptation in the adult-infant interaction.

Turning from our discussion of research focussed mainly on infant-adult interaction, I want to make brief reference to the increasing attention being directed to the problem of identifying the particular stimulus elements or cues which account for the apparent effectiveness of certain relatively complex stimulus

configurations as elicitors of early social and emotional responses in infants, often of a presumably unlearned sort. (This line of approach has traditionally been employed to advantage by ethologists in their analysis of the stimulus determinants of behavior in various species of animals and birds (Hinde, 1966; Thorpe, 1963)). For example, it has long been known that one of the most potent elicitors of the smiling response in early infancy is the face of the human adult, particularly when it is animated by talking and smiling. In recent years, investigators have been trying to specify more precisely which particular cues in this stimulus configuration are primarily involved in instigating smiling behavior at various points in the infant's development, beginning with the first few weeks of life (Ahrens, 1954; Wolff, 1963, 1966).

Paralleling this line of inquiry is a concern with exploring the social or emotional response-eliciting characteristics of a rather broad range of stimuli in various modalities. Salzen (1963), for example, working with one infant, found that at 8 weeks of age relatively simple, non-human visual stimuli elicited smiling responses (e.g., a black and white cardboard oval, particularly when rotated slowly). By the twelfth week, such simple stimuli failed to elicit smiling, but "novel" combinations of visual and auditory cues, such as a rattle or clock, would do so. Wolff (1963) was readily able to elicit smiling as well as positive vocalizations in 4 to 5 week old infants by placing the infant's hands in his own, and bouncing his hands together three times in rapid succession (as though playing "pat-a-cake"), while keeping his face out of sight of the infant. A particularly interesting recent investigation by Kistiakovskaia (1965) was concerned with determining the stimulus conditions which elicit and help to establish the "positive emotional complex of responses" in infants during the first weeks and months of life. Her interpretation placed particular emphasis upon the role of rather prolonged visual fixation of immobile target objects, and of

convergence and divergence responses to an object being moved toward and away from the infant, as basic instigators of the earliest positive emotional responses of smiling, vocalization, and animated movements.

While the last several studies mentioned were directly concerned with stimulus determinants involved in the elicitation of smiling and other positive emotional responses, they can actually be regarded as part of several broader lines of currently active research dealing with the general problem of characteristics of incoming stimulation as they affect a variety of behavioral responses. It is to these lines of investigation that I would like now to turn.

The second broad area of contemporary research which I regard as having particularly promising implications for our understanding of the nature and role of emotional behavior in infancy is represented by studies dealing with the following set of discrete but related topics: a) approach-withdrawal processes; b) exploratory behavior, curiosity, and intrinsic motivation; and c) arousal or activation, orienting and alerting responses. By way of introductory comment, let me say that I believe that studies of these problems, which are very much under investigation currently with both humans and animals, are extremely relevant for the study of affect and emotional behavior, even though many of the investigations have not been directly concerned with affect or emotion as such to begin with. What these studies have in common, despite often diverse initial aims, is a concern with the behavioral orientation of the infant (or animal) toward particular types of external stimulation, as well as a concern with explaining such orientations in terms of the nature of the stimulus information impinging upon the subject, and the manner in which such information is "processed" as a function of the previous experience or current state of the infant. Since we regard emotions or affects as

having a physiological arousal or activation component, and a behavioral or action component which often takes the form of a heightened orientation toward or away from the salient object, the relevance of studies of the problems just mentioned should be obvious. At the same time, it seems to me that research on these very problems would often be enhanced by more direct efforts to isolate and study the affective or pleasure-displeasure components involved in the behavior being investigated.

Let me give you a few examples of some relevant issues and problems being considered in the general areas of research I have just mentioned.

Approach and Withdrawal Processes

While many of the previously discussed studies of infant-adult attachment dealt with approach and withdrawal responses of various types, I would like to speak here of research which reflects a more general concern with the nature of such processes. It is pretty generally agreed by many investigators that the response systems which mediate appropriate approach and withdrawal responses to stimuli of varying intensities (or qualities) are among the most fundamental,, from the point of view of both phylogenetic and ontogenetic development. In attempting to integrate the results of many studies in this area into a broad theory of approach-withdrawal processess, Schneirla (1965) has argued that it is the intensity of stimulation which is crucial: a broad range of low stimulus intensities (or small changes in intensity) tend to instigate approach responses while a broad range of high stimulus intensities (or large intensity changes) produce withdrawal responses. Stimulus intensity is not definable entirely objectively, but it is rather a matter of "effective stimulus input", which is a function of such factors as the particular species involved, as well as age,

previous experience, adaptation, etc. In the case of higher animals, intensity of stimulation is the crucial determinant early in life, while the qualitative features of different objects and stimuli become salient as a result of subsequent development and learning.

This point of view, of course, is directly opposed to the idea that animals (and human infants) are capable of manifesting approach or withdrawal responses to innately perceived qualitative features of stimuli (e.g., particular visual patterns or shapes). Schneirla has argued, for example, that the distress responses shown by ducklings to a moving hawk-shaped silhouette, and not to the same silhouette moving in the opposite direction (with the simulated appearance of a goose), can be explained in terms of differences in the magnitude of the changes in retinal stimulation produced, rather than by assuming an innate discrimination of the hawk from the goose configuration. A recent study (Green, Green, and Carr 1966) provides some confirmatory evidence for duckling's responding selectively to the configurational properties of the hawk silhouette. Recent studies with human neonates, of course, also provide increasing evidence of preferential visual responses to shape and pattern (Fantz and Nevis 1967).

There seems to be no doubt about the central importance of stimulus intensity and intensity change as one of the important determinants of approach and withdrawal responses (particularly the latter); at the same time there is good evidence that qualitative or structural features of stimuli play a salient role even very early in development, both with humans and some lower species. One of the crucial problems which Schneirla was attempting to deal with and which most current investigators are still struggling with, is that of how best to conceptualize and define the relevant characteristics of "the stimulus", so that we can look for more meaningful relationships between the infant's approach and withdrawal behavior, or emotional responses, and the nature of the stimulation impinging upon him.

Exploratory Behavior, Curiosity, and Intrinsic Motivation

One of the people who has been very much concerned with defining characteristics of stimulation which instigate approach behaviors such as exploration and curiosity is Berlyne (1960, 1966). In searching for a motivational explanation of such behavior in rats as well as in human infants, Berlyne proposed that there are certain "collative" properties of stimuli which induce curiosity and specific exploratory (or information seeking) activity. These properties include such characteristics as novelty, surprisingness, incongruity, and complexity. They are referred to as "collative" properties since they require that the animal collate or compare information from different stimulus elements which appear in some sense to be discrepant or incompatible, either with other elements in the same stimulus or with previously perceived stimuli. According to Berlyne, it is this uncertainty or incompleteness of information which generates the state of discomfort he regards as perceptual curiosity, and the function of specific exploratory behavior is to provide the additional information needed to reduce this discomfort. (Note the persistent influence of drive reduction theory here!)

Berlyne has gone considerably farther than Schneirla in attempting to specify a number of clearly important qualitative characteristics of stimuli which appear to elicit approach behavior, and in providing a hypothesized explanation of such behavior in terms of its information-seeking function. On the other hand, the collative properties of stimuli are still extremely difficult to define and measure objectively, in part because they depend to some extent on the subject's previous experience with the stimuli. Another perplexing problem, which has been with us for a long time, is that some novel, surprising, or incongruous stimuli produce conflicting approach and withdrawal reactions, or clear escape and fear responses. Some examples of this are the human infant's fear responses to strangers

toward the end of the first year of life, and the chimpanzee's marked fear reactions to cadavers or skulls of chimpanzees (Hebb 1946).

This problem has been dealt with by a number of people, including Hunt (1965), who considers the issue in considerable depth as part of his recent detailed discussion of the role of "intrinsic motivation" in psychological development (i.e., motivation not dependent on primary drive reduction, but intrinsic to such "spontaneous" activities as play, exploration, problem solving, etc.). Hunt includes the collative stimulus properties proposed by Berlyne under his generic concept of "incongruity", which is a central part of his theory of intrinsic motivation and early development. In this broader context, incongruity represents a discrepancy between stimulus information impinging on the infant at any given time and some relevant standard of comparison, which may be either "external" to the subject, in terms of ongoing or concurrent stimulation, or "internal" in the sense of its being based upon the stored information or "schemata" resulting from previous experience (See also Hunt, 1961, pp. 267-269).

Hunt proposes that the notion of an "optimal level of incongruity", which has been suggested in various forms by other theorists as well, may be the best way to account for the broad range of responses we find to various novel, surprising, or strange stimuli. According to this model, stimuli representing optimal levels of incongruity would be generally attractive for the infant, and might be regarded as generating an "optimal" level of arousal or physiological activation. Stimuli constituting extreme degrees of incongruity would instigate withdrawal or escape responses, while stimulus conditions representing levels well below the optimal (e.g., conditions of minimal or unchanging stimulation) would elicit attempts to seek interaction with the environment providing higher levels of incongruity. Presumably the affective state or hedonic tone associated with optimal incongruity levels would be generally positive, while that associated with either of the

extreme levels would be generally negative.

This "optimal level" model we've been discussing has seemed to many of us to be a basically reasonable and heuristically valuable one. On the other hand, it is extremely difficult to define levels of incongruity objectively in our specific research endeavors, and one has to guard against the tendency to base one's stimulus definitions, even in part, upon the nature of the infant's or animal's responses. As Hunt himself puts it, the concept of incongruity is "operationally slippery" (1965, p. 213). For example, Morgan and I found (1968) that while our infants began to respond less positively or more negatively to the strange experimenter as we moved from the 8 month to the 12 month level, they appeared increasingly to enjoy both a realistic and a grossly distorted mask of the human face which we presented at the end of a rod. How do we determine objectively whether the strange examiners or the masks were the most incongruous stimuli, representing the greater discrepancy from the infant's "schemata" of familiar faces or persons? There is also the problem, of course, of determining what other motivational or experiential factors might have been operating, in addition to incongruity as such. As we begin to find better solutions to specific questions like these, we ought to be able to gain a better understanding of the determinants of the infant's behavior, and to confirm, or elaborate on, the optimal level of incongruity notion.

Arousal or Activation; Orienting and Alerting Responses

Generally speaking the concepts of arousal or activation refer to such characteristics as excitation, alertness, or responsivity, which are manifested in a complex of physiological changes (e.g., in heart rate, respiration, electrical activity of the brain, muscle action potentials, etc.), as well as in such behavioral properties as activity level, motility patterns, postural responses, attentiveness to stimuli, etc. The question of the levels and patterns of arousal associated

with various forms of approach and withdrawal reactions, exploratory behavior, and other intrinsically motivated behaviors, is obviously a very important one.

An increasing amount of systematic research attention is being directed to the general problems of arousal and activation in infants as well as animals, both in the context of the kinds of problems we've been discussing, as well as in other contexts (e.g., Duffy, 1962; Lynn, 1966). Much of the contemporary research in this area has been stimulated by the extensive Russian studies of the physiological and behavioral responses associated with the "orientation reaction" (when the animal responds to a stimulus with the mobilization of a complex of responses which appear to make him maximally alert to and prepared to deal with the stimulus). The differential response patterns associated with "defensive reactions", generated by too intense or too sudden stimuli, has also been under investigation (See Lynn, 1966, for a summary of this Russian work).

While there are many technical as well as conceptual problems involved in the securing and utilization of physiological measures as indices of arousal or activation, a good deal of hard and generally promising work is being done on the development and use of such measures, often in association with related behavioral indices. Changes in heart rate, respiration, or electrical skin potential, for example, are being employed as indices of degree of responsiveness or attention to both visual and auditory stimuli in neonates and in older infants (Brackbill, et al. 1966; Graham and Clifton, 1966; Lewis, et al. 1966; Stechler, Bradford and Levy, 1966; Steinschneider, Lipton, and Richmond, 1966).

There has also been a great deal of recent effort directed toward more precise assessment of the behaviorally observable arousal or activation characteristics of newborns and very young infants (sometimes referred to as the "state" variable), either as a relatively stable characteristic of the individual infant (Birns, 1965; Escalona, 1962), or as an important "baseline" condition which must be specified

for any infant at the time when his responses to particular stimulation are being observed and evaluated (Escalona, 1965; Prechtl, 1965; Wolff, 1966).

In such studies of arousal in very young infants it seems pretty clear that we are often dealing with at least rudimentary precursors of emotional behavior. It is interesting to note, for example, that the highest level of behavioral arousal in these studies is usually judged by the presence of marked crying, agitation, and irritability, or what some of us might be quite willing to call a state of hedonically negative excitation. As a matter of fact, the general question of the aversiveness or attractiveness of different levels of arousal or activation is a very fundamental one which has concerned psychological theorists for a long time. Closely paralleling the notion of "optimal levels of incongruity", which we discussed earlier, is the point of view that much of the organism's behavior is directed toward obtaining or maintaining optimal levels of arousal or activation, since levels which are either too high or too low are aversive, and in some sense hedonically or affectively negative (See Hunt, 1965, for a theoretical discussion of these issues).

While the reduction of aversively high levels of arousal (or drive) has long been accepted as a prime motivational determinant of behavior, the notion that animals or humans will behave so as to increase their levels of arousal, incongruity, or stimulation, is a more recent arrival on the experimental scene. The precise circumstances under which such behavioral events will take place and why they take place, are questions that are far from being answered to everyone's satisfaction. For example, are some forms of exploratory behavior and simple problem solving activities engaged in by infants primarily because they are intrinsically pleasurable and perhaps generate an "optimal level of arousal" (as Buhler (1930) or Hunt (1965) might argue), or because they serve to reduce the discomfort of boredom drive or perceptual curiosity (as Berlyne might put the matter); or are both

factors operative at different points in the ongoing behavior? Are some forms of perceptual or investigatory activity sustained because the organism is biologically and psychologically constructed to operate on incoming stimulus information until it is somehow meaningfully "processed" and assimilated with previously stored information (as Piaget (1952) or Hunt (1965) might put it), with the hedonic or affective state accompanying such activities often being essentially neither positive nor negative, though the infant may be operating at a relatively high level of arousal and alertness?

In the course of reviewing the impressive body of literature on approach and withdrawal processes, exploratory behavior, intrinsic motivation, and arousal or activation phenomena, it has seemed to me that some of the issues raised by research in these areas, including the specific questions I've just posed, might be approached more fruitfully if we attempted to specify more directly the hedonic, or pleasure-displeasure characteristics associated with the behaviors we are attempting to understand. Admittedly this is not always an easy task, particularly if we try to identify behavioral indicators of pleasure-displeasure (or affective tone) which are distinguishable from the responses we are utilizing as indicators of approach or withdrawal, and of arousal or activation, as I think needs to be done.

What are some of the alternatives to this approach? One alternative followed by some investigators, is to ignore the issue of hedonic qualities, on the grounds that these pleasure-displeasure components cannot be specified objectively anyway, although one might still be perfectly willing to employ expressive responses like the distress calls of pups or ducklings as objective indicators of avoidance reactions, and the smile of the infant as an indicator of approach behavior or attention. Other alternatives, shown in some of the theoretical discussions

already cited, involve making a number of implicit assumptions about the qualities of aversiveness or attractiveness, pleasure or displeasure, which might be associated with various forms of approach and withdrawal behavior, and with various levels of arousal. Clearly, however, we'd be considerably better off if we had more direct measures of the pleasure-displeasure characteristics associated with these behaviors.

These are some of the reaons why, in our own current research[2] on emotional behavior in the first year of life, we are directing some of our major efforts to the problem of identifying, hopefully by independent criteria, appropriate behavioral indicators of the three essential characteristics of the infant's responses which we've been discussing, namely: 1) the approach-withdrawal, or "directional" qualities of the behavior (distinguished as stimulus maintaining and enhancing, stimulus seeking, stimulus terminating and avoiding, much in the manner suggested by Schneirla (1965) and Ambrose (1963)); 2) the arousal or activation characteristics (in terms of activity and motility increases or inhibition, intensity of responses, and eventually, selected physiological responses); and 3) the pleasure-displeasure, or hedonic qualities (as reflected in facial behavior, smiling, laughing, crying, other qualities of vocalizations and accompanying movements). Our hope is that if we can more adequately identify and assess these specific qualities of the infant's responses, we should be in a much better position to examine empirically the patterns of relationship among them, as components of what we regard as emotional behavior. At the same time, we ought to be able to arrive at more meaningful descriptions and analyses of the many ambiguous and conflictful or mixed reactions one observes so often in infants as they are confronted with

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such "incongruous" stimuli as unfamiliar or unexpected object movements or sounds, strange adults or strange environments, distortions of familiar stimuli, novel or "surprising" stimuli of various sorts, etc.

In summary, my major purpose in this paper has been to point out and discuss some contemporary research issues and emphases which appear to me to be of particular significance in regard to the general problem of social and emotional behavior and development in infancy. I have tried to indicate very briefly the historical contrast, as well as the continuity, between these current research issues and some of the central concerns of early investigators in the field. One pervasive and important research emphasis has been a concern with more precise analyses of stimulus and situational determinants of social and emotional behavior, as shown in the many studies of infant attachment behavior in both humans and animals, and in analyses of the eliciting as well as the reinforcing effects of salient stimuli involved in infant-adult interaction.

Another set of very important issues is being investigated widely in connection with research on approach and withdrawal processes; exploratory behavior, curiosity and intrinsic motivation; and arousal or activation. These problem areas are particularly relevant to our concern with emotional behavior in infancy, since they deal essentially with the directional and the arousal characteristics of the infant's responses, both of which we regard as important components of emotional behavior. I have suggested that if we can combine our studies of these aspects of the infant's responses with better assessments of the pleasure-displeasure, or hedonic qualities involved in such behavior, our research efforts in this area should be considerably enhanced.

One of our main problems is still that of adequately conceptualizing the nature of emotional processes early in life, and the transformations undergone

by these processes and their precursors during ontogenesis, beginning with birth. Some of the most perceptive discussions of these difficult issues may be found in the recent writing of Spitz (1963) and Wolff (1966, pp. 74-80). Concurrent with these conceptual problems are those we face in attempting to assess the most salient behavioral indicators of emotional responses in infants at different points in development. It seems to me that as we make further progress along these basic lines, investigations focussed on the influence of major "independent" variables on emotional and social development in infancy will be considerably more fruitful.

Finally, I think that it is probably obvious by now that we cannot adequately study social and emotional behavior in infancy independently of other basic psychological processes involved in the infant's behavior and development. Perceptual-cognitive and learning processes clearly play a major role in determining what social or emotional responses will be elicited by particular stimulus conditions, as well as how such responses will be expressed in behavior. Much of the contemporary research we've discussed has been very much concerned with just this sort of interaction. Conversely, social and emotional factors play a significant role in the development of perceptual-cognitive behavior and of various motivational systems. One of the significant features of the contemporary research scene is that many investigators are increasingly inclined to examine the role of the <u>various</u> psychological processes which may be involved in particular transactions of importance between the infant and his environment.

References

Ahrens, R. Beitrag zur Entwicklung der Physiognomie und Mimikerkennens. Zeit. fur exp. und ang. Psychol., 1954, 2, 414-454; 599-633.

Ambrose, J. A. The age of onset of ambivalence in early infancy: indications from the study of laughing. J. Child Psychol. Psychiat., 1963, 4, 167-187.

Baldwin, J. M. Mental development in the child and in the race. New York: Macmillan, 1895.

Berlyne, D. Conflict, arousal and curiosity. New York: McGraw Hill, 1960.

Berlyne, D. Curiosity and exploration. Science, 1966, 153, 25-33.

Birns, Beverly. Individual differences in human neonates' responses to stimulation. Child Develpm., 1965, 36, 249-256.

Blatz, W. E. & Millichamp, D. A. The development of emotion in the infant. Univ. Toronto Studies, Child Develpm. Series, 1935, 4.

Bowlby, J. The nature of the child's tie to his mother. Int. J. Psychoanal., 1958, 39, 350-373.

Bowlby, J. Separation anxiety. Int. J. Psychoanal., 1960, 41, 89-113.

Brackbill, Yvonne, Adams, Gail, Crowell, D. H. & Gray, M. Libbie. Arousal level in neonates and preschool children under continuous auditory stimulation. J. Exp. Child Psychol., 1966, 4, 178-188.

Bridges, K. M. B. Emotional development in early infancy. Child Develpm., 1932, 3, 324-341.

Bronfenbrenner, U. Early deprivation: a cross-species analysis. In Grant Newton (Ed.) Early experience and behavior. Springfield, Illinois: Charles C. Thomas, 1968 (in press).

Buhler, Charlotte, The first year of life. New York: John Day, 1930.

Buhler, Charlotte & Hetzer, H. Testing children's development from birth to school age. New York: Farrar & Rinehart, 1935.

Buhler, K. The mental development of the child. New York: Harcourt Brace, 1930.

Cattell, Psyche. The measurement of intelligence of infants and young children. New York: Psychological Corporation, 1940.

Darwin, C. (1873) The expression of the emotions in man and animals. New York: Philosophical Library, 1955.

Duffy, Elizabeth. Activation and behavior. New York: Wiley, 1962.

Escalona, Sibylle K. The study of individual differences and the problem of state. J. Child Psychiat., 1962, 1, 11-37.

Escalona, Sibylle K. Some determinants of individual differences. Trans. New York Acad. Sci., 1965, 27, 802-816.

Escalona, Sibylle K. Emotional development in the first year of life. Problems of infancy and childhood. Milton J. E. Senn (Ed.), New York: Josiah Macy Jr., Foundation, 1953, 11-92.

Fantz, R. L. & Nevis, Sonia. Pattern preferences and perceptual-cognitive development in early infancy. Merrill-Palmer Quart., 1967, 13, 77-108.

Gesell, A. Infancy and human growth. New York: Macmillan, 1928.

Gesell, A., et al. The first five years of life. New York: Harper, 1940.

Gewirtz, Hava B. & Gewirtz, J. L. Caretaking settings, background events, and behavior differences in four Israeli child-rearing environments: some preliminary trends. In B. M. Foss (Ed.) Determinants of infant behavior IV. London: Methuen; New York: Wiley, 1968. (in press).

Graham, Frances K. & Clifton, Rachel K. Heart rate change as a component of the orienting response. Psychol. Bull., 1966, 65, 305-320.

Green, Marsha, Green, R. & Carr, W. J. The hawk-goose phenomenon: a replication and an extension. Psychon. Sci., 1966, 4, 185-186.

Griffiths, R. The abilities of babies. London: Univ. of London Press, 1954.

Hamburg, D. A. Emotions in the perspective of human evolution. In P. H. Knapp (Ed.) Expression of the emotions in man. New York: Int. Univ. Press, 1963, pp. 300-317.

Harlow, H. F. The development of affectional patterns in infant monkeys. In B. M. Foss (Ed.) Determinants of infant behavior I. London: Methuen; New York: Wiley, 1961, pp. 75-97.

Hebb, D. O. On the nature of fear. Psychol. Rev., 1946, 53, 259-276.

Hinde, R. A. Animal behavior. New York: McGraw Hill, 1966.

Hunt, J. McV. Intelligence and experience. New York: Ronald Press, 1961.

Hunt, J. McV. Intrinsic motivation and its role in psychological development. In David Levine (Ed.) Nebraska symposium on motivation. Lincoln, Nebraska: Univ. of Nebraska Press, 1965, pp. 189-282.

Jersild, A. T. & Holmes, F. B. Children's fears. Child Develpm. Monogr., 1935, 20.

Jones, H. E. & Jones, Mary C. A study of fear. Childhood Educ., 1928, 5, 136-143.

Kistiakovskaia, M. I. Stimuli evoking positive emotions in infants in the first months of life. Sov. Psychol. Psychiat., 1965, 3, 39-48.

Lewis, M., Kagan, J., Campbell, Helen & Kalafat, J. The cardiac response as a correlate of attention in infants. Child Develpm., 1966, 37, 63-72.

Lynn, R. Attention, arousal, and the orientation reaction. London: Pergamon Press, 1966.

Morgan G. & Ricciuti, H. N. Infants' responses to strangers during the first year. In B. M. Foss (Ed.) Determinants of infant behavior IV. London: Methuen; New York: Wiley, 1968 (in press).

Piaget, J. The origins of intelligence in children. New York: Int. Univ. Press, 1952.

Prechtl, H. F. R. Problems of behavioral studies in the newborn infant. In D. S. Lehrman, R. A. Hinde, & E. Shaw (Eds.), Advances in the study of behavior I. New York and London: Academic Press, 1965, pp. 75-98.

Rheingold, Harriet L. The effect of a strange environment on the behavior of infants. In B. M. Foss (Ed.) Determinants of infant behavior IV. London: Methuen; New York: Wiley, 1968 (in press).

Rheingold, Harriet, Gewirtz, J. L. & Ross, Helen W. Social conditioning of vocalizations. J. Comp. Physiol. Psychol., 1959, 52, 68-73.

Salzen, E. Visual stimuli eliciting the smiling response in the human infant. J. Genet. Psychol., 1963, 102, 51-54.

Sander, L. W. & Julia, H. Continuous interactional monitoring in the neonate. Psychosom. Med., 1966, 28, 822-835.

Schneirla, T. C. Aspects of stimulation and organization in approach/withdrawal processes underlying vertebrate behavioral development. In D. S. Lehrman, R. A. Hinde, & E. Shaw (Eds.), Advances in the study of behavior I. New York and London: Academic Press, 1965, pp. 1-74.

Spitz, R. Anxiety in infancy. Int. J. Psychoanal., 1950, 31, 138-143.

Spitz, R. A. Ontogenesis: the proleptic function of emotion. In P. H. Knapp (Ed.) Expression of the emotions in man. New York: Int. Univ. Press, 1963, pp. 36-64.

Stechler, G., Bradford, Susan & Levy, H. Attention in the newborn: effect on motility and skin potential. Science, 1966, 151, 1246-1248.

Steinschneider, A., Lipton, E. L. & Richmond, J. B. Auditory sensitivity in the infant: effect of intensity on cardiac and motor responsivity. Child Develpm., 1966, 37, 233-252.

Stern, W. Psychology of early childhood. New York: Holt, 1924.

Rheingold, Harriet L. The development of social behavior in the human infant. Monogr. Soc. Res. Child Develpm., 1966, 31, No. 5, 1-17.

Stettner, L. J. & Tilds, B. N. Effect of presence of an imprinted object on response of ducklings in an open field and when exposed to fear stimulus. Psychon. Science, 1966, 4, 107-108.

Sully, J. Studies of childhood. New York: D. Appleton, 1895.

Thorpe, W. H. Learning and instinct in animals. London: Methuen, 1963.

Tomkins, S. S. Affect, imagery, consciousness. Vol. I. The positive affects. Vol. II. The negative affects. New York: Springer, 1962, 1963.

Watson, J. B. & Morgan, J. J. B. Emotional reactions and psychological experimentation. Amer. J. Psychol., 1917, 28, 163-174.

Wolff, P. H. The causes, controls, and organization of behavior in the neonate. Psychol. Issues, 1966, 5, No. 17.

Wolff, P. H. Observations on the early development of smiling. In B. M. Foss (Ed.) Determinants of infant behavior II. London: Methuen; New York: Wiley, 1963, 113-138.

Yarrow, L. J. Separation from parents during early childhood. In M. L. Hoffman and Lois Hoffman (Eds.) Rev. of Child Develpm. Res., Vol. I, 1964, 89-136.